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(12) # EUROPEAN PATENT APPLICATION

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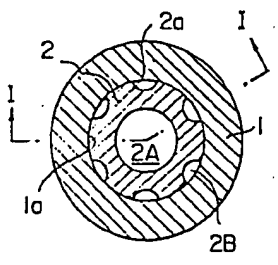
(54) **Nozzle for gas cigarette lighter.**

(57) A nozzle for a gas cigarette lighter comprises a nozzle body (1) having a center hole (1A), and a nozzle plug member (2) having a main nozzle hole (2A) at the center and inserted into the center hole (1A) of the nozzle body (1). Many subsidiary nozzle holes (2B) are defined by grooves (2a) between the inner circumferential surface of the nozzle body (1) and the peripheral surface of the nozzle plug member (2). The total cross-sectional area of the subsidiary nozzle holes (2B) is selected within the range between 20% and less than 100% of the cross-sectional area of the main nozzle hole (2A). To restrict the insertion depth of the nozzle plug member, step-like portions (2C/2D) are provided on the peripheral surface of the nozzle plug member (2).

FIG.2




EP 0 122 500 A1

## BACKGROUND OF THE INVENTION

### Field of the Invention

This invention relates to an improvement in a nozzle for a gas cigarette lighter.

### Description of the Prior Art

In general, nozzles for gas cigarette lighters are provided with a single through hole at the center. Particularly for the nozzle of electronic gas cigarette lighters using piezoelectric ignition devices which are difficult to ignite, various attempts have been made to improve the ignition efficiency. For example, it has been proposed to incorporate a coil spring into the gas jetting aperture of a nozzle hole to divide a jetting gas stream between the windings of the coil spring to the outside, thereby increasing the width of the gas stream. Also, as disclosed in Japanese Utility Model Publication No. 45(1970)-4298, it has been proposed to form the nozzle hole at the center of a nozzle as a large jetting hole section, and to fit a plug provided with protrusions and recesses at the periphery thereof so as to position many orifices in a ring-like pattern, thereby jetting a wide gas stream.

However, the aforesaid conventional nozzles have drawbacks with regard to practical use, and a need exists for a further improved nozzle.

That is, in the former nozzle using a coil spring, the task of pressure-fitting the small coil spring into the nozzle hole is troublesome, necessitating

a high manufacturing cost. Particularly in a process for manufacturing a large number of gas cigarette lighters, the pressure-fitting work obstructs automatic operation of the process and thus presents a very real problem with regard to manufacture. On the other hand, in the latter nozzle using a plug provided with protrusions and recesses at the periphery thereof, the plug adversely affects the flame shape and may not necessarily improve the ignition efficiency. Thus the nozzle is not suitable for practical use. Further, when the fine orifices are clogged with dust or the like, the amount of gas jetted through the orifices becomes small, and the ignition efficiency is rather decreased.

## SUMMARY OF THE INVENTION

The primary object of the present invention is to provide a nozzle for a gas cigarette lighter, which is suitable for practical use and exhibits a high ignition efficiency.

Another object of the present invention is to provide a nozzle for a gas cigarette lighter, which is suitable for automatic mass-production and thus is inexpensive.

The nozzle for a gas cigarette lighter in accordance with the present invention is provided with a plurality of subsidiary nozzle holes around a main nozzle hole at the center of the nozzle so that the total cross-sectional area of the subsidiary nozzle holes is smaller than the cross-sectional area of the main

nozzle hole. Specifically, the ratio of the total cross-sectional area of the subsidiary nozzle holes to the cross-sectional area of the main nozzle hole is selected from the range between 0.2 : 1 and less than 1 : 1, i.e. from the range between 20% and less than 100%. The ratio should be preferably within the range between 30% and 70%, and more preferably within the range between 35% and 55%. When this ratio is smaller than 20%, the gas stream dividing effect becomes insufficient, and the ignition efficiency cannot be improved. If the ratio is 100% or higher, the effect of the flame around the center flame becomes too much larger than the effect of the center flame. Thus the flame shape deteriorates, and the ignition efficiency is decreased.

The nozzle of the present invention exhibits a markedly improved ignition efficiency. Further, since no coil spring is used, the nozzle is easy to manufacture and suitable for automatic mass-production. Thus the nozzle of the present invention is inexpensive and is very suitable for practical use.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a fragmentary longitudinal sectional view (taken along line I-I of Figure 2) showing the gas jetting aperture portion of an embodiment of the nozzle for a gas cigarette lighter in accordance with the present invention,

Figure 2 is a transverse sectional view of Figure 1 (taken along line II-II of Figure 1),

Figure 3 is a plan view showing the nozzle plug member employed in the nozzle of Figures 1 and 2,

Figure 4 is a fragmentary sectional view taken along line IV-IV of Figure 3,

Figure 5 is a fragmentary longitudinal sectional view (taken along line V-V of Figure 6) showing another embodiment of the nozzle for a gas cigarette lighter in accordance with the present invention,

Figure 6 is a transverse sectional view of Figure 5 (taken along line VI-VI of Figure 5),

Figure 7 is a fragmentary longitudinal sectional view showing a further embodiment of the nozzle for a gas cigarette lighter in accordance with the present invention,

Figure 8 is a perspective view showing the nozzle of Figure 7,

Figure 9 is a perspective view showing the nozzle plug member employed in the nozzle of Figures 7 and 8,

Figures 10 and 11 are a plan view and a longitudinal sectional view showing the nozzle plug member of Figure 9,

Figure 12 is a perspective view showing a still further embodiment of the nozzle for a gas cigarette ligher in accordance with the present invention,

Figure 13 is a perspective view showing the nozzle plug member employed in the nozzle of Figure 12,

Figures 14 and 15 are a plan view and a longitudinal sectional view showing the nozzle plug member

of Figure 13.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention will hereinbelow be described in further detail with reference to the accompanying drawings.

The nozzle shown in Figures 1 to 4 comprises a nozzle body 1 provided with a center hole 1A. The center hole 1A comprises a large diameter portion 1a formed at the upper end portion thereof, a small diameter portion 1b below the large diameter portion 1a, and a tapered portion 1c positioned between the large diameter portion 1a and the small diameter portion 1b. Into the large diameter portion 1a is pressure-fitted a nozzle plug member 2 having a main large diameter nozzle hole 2A at the center thereof and a plurality of small diameter grooves 2a for constituting subsidiary nozzle holes in the peripheral surface of the nozzle plug member 2. By pressure-fitting the nozzle plug member 2 into the large diameter portion 1a of the nozzle body 1, a single main nozzle hole 2A and a plurality of subsidiary nozzle holes 2B are obtained.

The nozzle plug member 2 may, for example, have an outer diameter of 1mm and a length of 3.3mm. The diameter of the main nozzle hole 2A may, for example, be 0.5mm. The depth of the grooves 2a in the peripheral surface of the nozzle plug member 2 may be 0.1mm, and the number of the grooves 2a may be six. In this case, in the nozzle thus completed, the ratio of the total

cross-sectional area of the subsidiary nozzle holes 2B to the cross-sectional area of the main nozzle hole 2A is about 47%. As described above, the ratio should be within the range between 20% and less than 100%.

By "cross-sectional area" is meant the cross-sectional areas of the subsidiary nozzle holes 2B and the main nozzle hole 2A at the gas jetting apertures thereof, i.e. at the upper end of the nozzle body 1. In the embodiment of Figures 1 to 4, the cross-sectional areas are the same both at the gas jetting apertures at the upper end of the nozzle body 1 and at the inner portion of the nozzle body 1 below the upper end thereof. However, when there is a difference between the cross-sectional areas of the holes at the upper end of the nozzle body 1 and the inner portion thereof, it is the cross-sectional areas of the holes at the upper end of the nozzle body 1 which should be adjusted to within the range described above.

In the aforesaid embodiment, the grooves 2a for the subsidiary nozzle holes 2B are formed in the peripheral surface of the nozzle plug member 2. However, it is also possible to position the grooves in the inner circumferential surface of the nozzle body 1 and to make the peripheral surface of the nozzle plug member 2 cylindrical in shape with no grooves. Figures 5 and 6 show such an embodiment. In Figures 5 and 6, similar elements are numbered with the same reference numerals and characters with respect to Figures 1 to 4. In this embodiment, a plurality of grooves 1a' are provided in

the inner circumferential surface of the large diameter portion 1a of the nozzle body 1, and a cylindrical nozzle plug member 2 having no grooves is pressure-fitted into the large diameter portion 1a. As a result, a plurality of subsidiary nozzle holes 2B is defined between the peripheral surface of the nozzle plug member 2 and the grooves 1a' in the inner circumferential surface of the large diameter portion 1a of the nozzle body 1. In this case, the tapered portion 1c of the nozzle body 1 must be provided with grooves 1c' communicating with the grooves 1a'.

In the embodiments described above, the upper end of the nozzle plug member 2 is flush with the upper end of the nozzle body 1. However, it is also possible to construct the nozzle so that the upper end of the nozzle plug member 2 projects from the upper end of the nozzle body 1.

In the aforesaid embodiments, when the nozzle plug member 2 is pressure-fitted into the nozzle body 1, it may happen that the lower end portion of the nozzle plug member 2 is inserted excessively into the nozzle body 1. In such a case, the lower end portion of the nozzle plug member 2 is struck against the tapered portion 1c in the center hole 1A of the nozzle body 1, and there is the risk of the subsidiary nozzle holes 2B being closed at least partially. This problem can be eliminated by defining the pressure-fitting depth of the nozzle plug member 2 by the provision of step-like portions

on the peripheral surface of the nozzle plug member 2. Figures 7 to 11 and Figures 12 to 15 show such embodiments. In Figures 7 to 11 and Figures 12 to 15, similar elements are numbered with the same reference numerals and characters with respect to Figures 1 to 4.

In the embodiment of Figures 7 to 11, the nozzle plug member 2 is provided with step-like portions 2C on the peripheral surface at a predetermined intermediate position in the longitudinal direction of the nozzle plug member 2. When the nozzle plug member 2 is pressure-fitted into the nozzle body 1, the lower end faces of the step-like portions 2C of the nozzle plug member 2 come into contact with the upper end face of the nozzle body 1 and prevent the nozzle plug member 2 from being further inserted into the nozzle body 1. Thus the step-like portions 2C define the pressure-fitting depth of the nozzle plug member 2, and eliminate the risk of the subsidiary nozzle holes 2B being closed due to excessive insertion of the nozzle plug member 2.

In the embodiment of Figures 12 to 15, the nozzle plug member 2 is provided with step-like portions 2D extending from a predetermined intermediate position on the peripheral surface of the nozzle plug member 2 to the upper end of the nozzle plug member 2. In this embodiment, too, the lower end faces of the step-like portions 2D define the pressure-fitting depth of the nozzle plug member 2 when the nozzle plug member 2 is pressure-fitted into the nozzle body 1, and eliminate

the risk of the subsidiary nozzle holes 2B being closed due to excessive insertion of the nozzle member 2.

In the embodiments as described above, the nozzle plug member 2 is fabricated as a part pressure-fitted into the nozzle body 1. However, it is also possible to fabricate the nozzle plug member 2 integrally with the nozzle body 1. In this case, the center of the integral nozzle plug member 2 is perforated by the large diameter main nozzle hole 2A, and a plurality of small diameter subsidiary nozzle holes 2B is perforated around the main nozzle hole 2A. This modification is advantageous in that the step of pressure-fitting the nozzle plug member 2 into the nozzle body 1 is unnecessary.

Claims:

1. A nozzle for a gas cigarette lighter comprising a main nozzle hole (2A) at the center of the nozzle (1), and a plurality of subsidiary nozzle holes (2B) positioned around said main nozzle hole, the total cross-sectional area of said subsidiary nozzle holes (2B) being within the range between 20% and less than 100% of the cross-sectional area of said main nozzle hole (2A).

2. A nozzle as defined in Claim 1 wherein the total cross-sectional area of said subsidiary nozzle holes (2B) is within the range between 30% and 70% of the cross-sectional area of said main nozzle hole (2A).

3. A nozzle as defined in Claim 2 wherein the total cross-sectional area of said subsidiary nozzle holes (2B) is within the range between 35% and 55% of the cross-sectional area of said main nozzle hole (2A).

4. A nozzle as defined in Claim 1 wherein the nozzle comprises a nozzle body (1) having a center hole (1A), and a nozzle plug member (2) having said main nozzle hole (2A) at the center thereof and a plurality of

grooves (2a) in the peripheral surface thereof, said nozzle plug member (2) being fitted into said center hole (1A) of said nozzle body (1) to define said subsidiary nozzle holes (2B) between the surfaces of said grooves (2a) of said nozzle plug member (2) and the inner circumferential surface of said center hole (1A) of said nozzle body (1).

5. A nozzle as defined in Claim 1 wherein the nozzle comprises a nozzle body (1) having a center hole (1A), a plurality of grooves (2a) being positioned in the inner circumferential surface of said center hole (1A), and a nozzle plug member (2) having said main nozzle hole (2A) at the center thereof, said nozzle plug member (2) being fitted into said center hole (1A) of said nozzle body to define said subsidiary nozzle holes (2B) between the peripheral surface of said nozzle plug member (2) and the surfaces of said grooves (1a') in the inner circumferential surface of said center hole (1A) of said nozzle body (2).

6. A nozzle as defined in Claim 4 or 5 wherein said nozzle plug member (2) is provided with step-like portions on the peripheral surface thereof, said step-like portions (2C) extend partially from a predetermined intermediate position in the longitudinal direction of said nozzle plug member (2) towards the upper end of said nozzle plug member (2), and the lower end faces of said step-like portions are rested on the upper end face of said nozzle body (1).

7. A nozzle as defined in Claim 4 or 5 wherein said nozzle plug member (2) is provided with step-like portions (2D) on the peripheral surface thereof, said step-like

portions (2D) extend from a predetermined intermediate position in the longitudinal direction of said nozzle plug member (2) up to the upper end of said nozzle plug member (2), and the lower end faces of said step-like portions are rested on the upper end face of said nozzle body (1).

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FIG.1

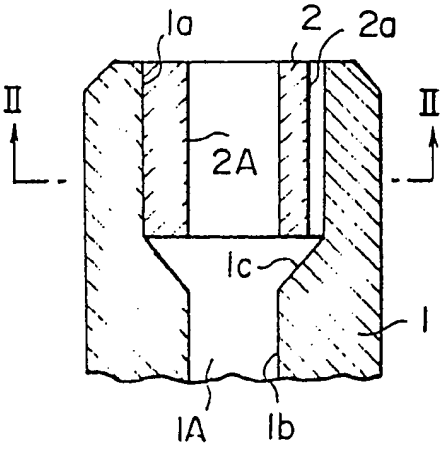


FIG.2

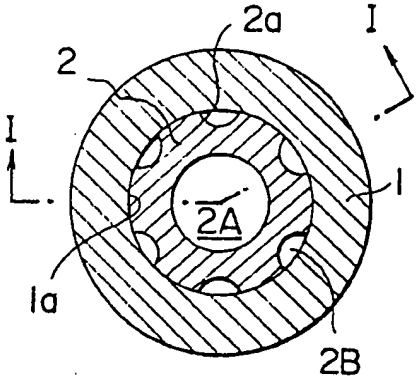


FIG.3

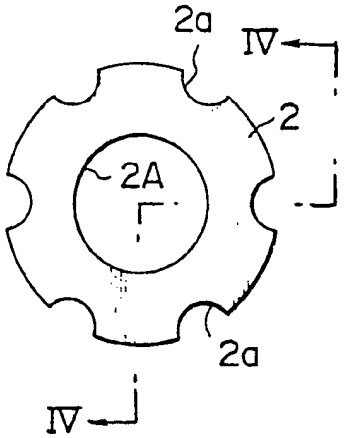


FIG.4

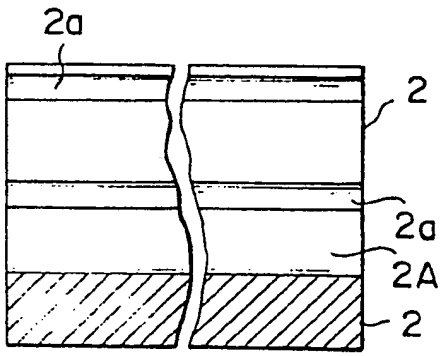


FIG.5

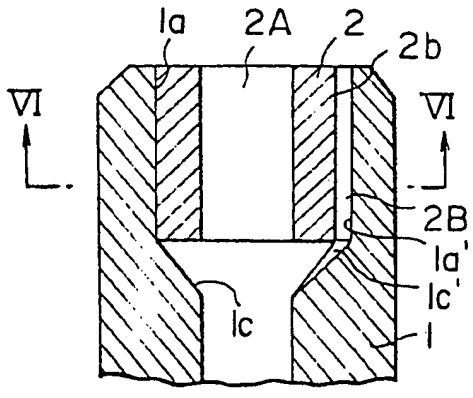


FIG.6

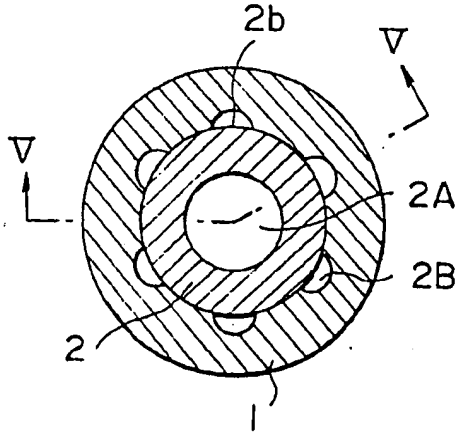

FIG.7

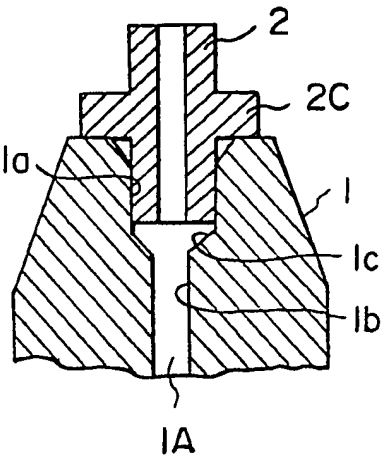


FIG.8

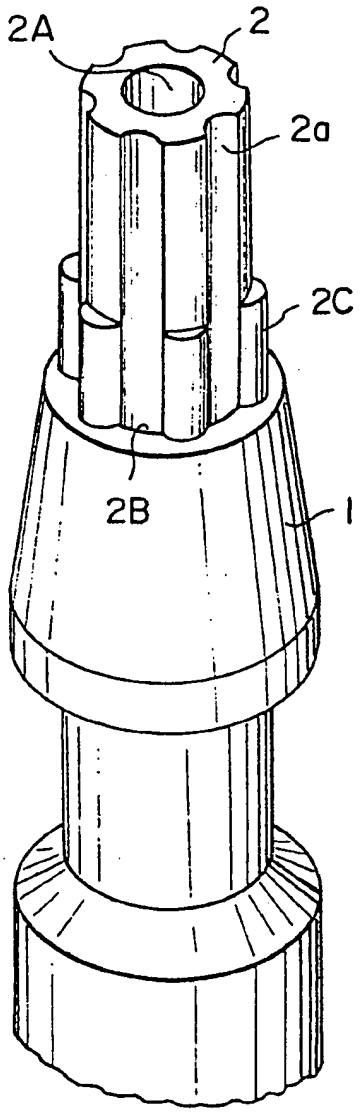


FIG.9

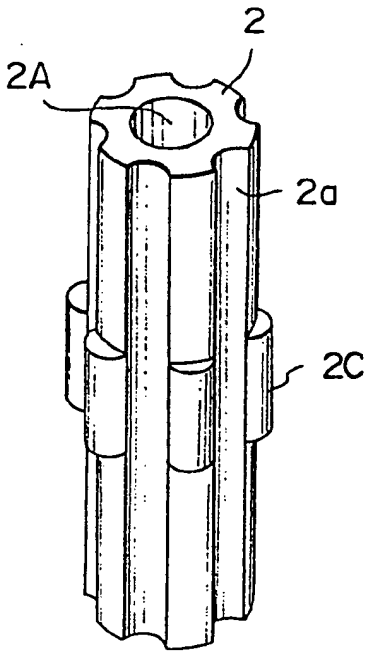

FIG.10

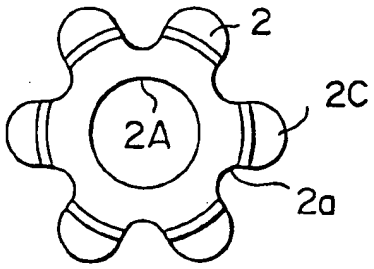


FIG.11

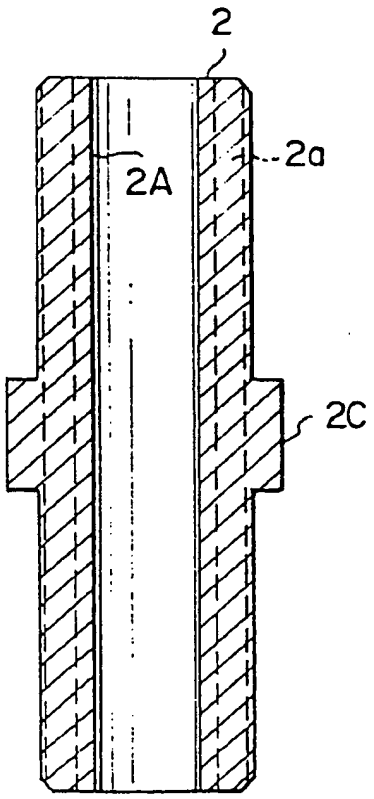


FIG.12

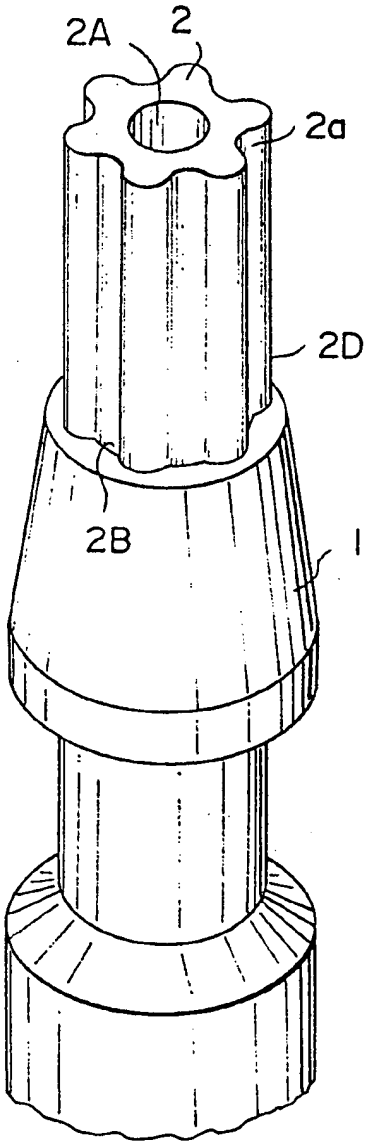

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FIG.13

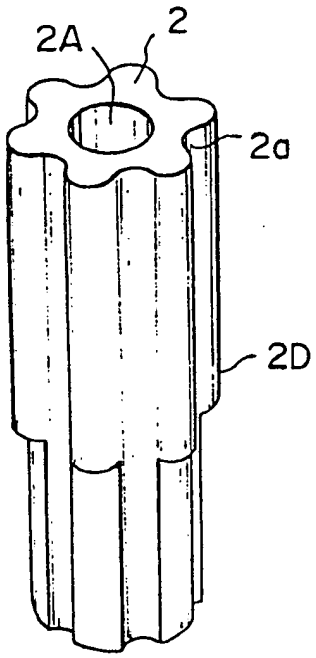



FIG.14

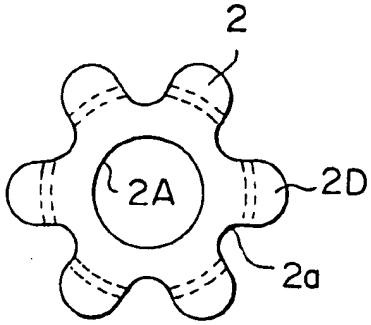
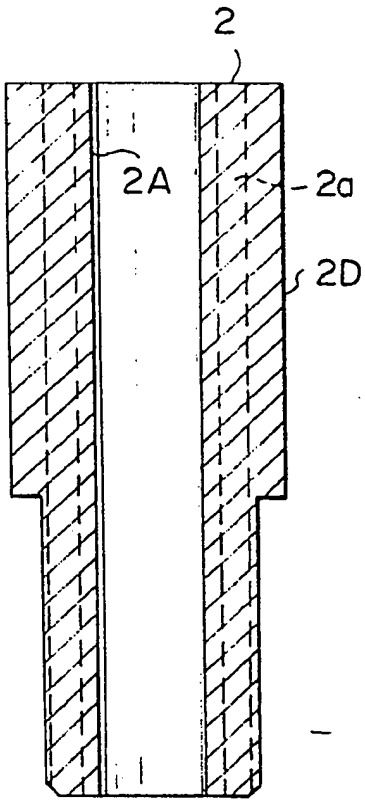



FIG.15



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# EUROPEAN SEARCH REPORT

0122500
Application number

EP 84103070.3

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl. ³) |
|---|---|---|---|
| | DE - A1 - 2 526 858 (SAFFA S.P.A.) | | F 23 Q 2/16 |
| X | * Totality * | 1,2 | |
| Y | * Fig. 2 * | 3,4 | |
| A | | 5 | |
| | -- | | |
| Y | GB - A - 1 285 188 (RADIATION LIMITED) | 3 | |
| | * Fig. 3,4,5 * | | |
| | -- | | |
| Y | DE - B - 1 212 326 (MALTNER GMBH) | 4 | |
| | * Fig. 3 * | | |
| | -- | | |
| A | AT - B - 241 757 (JUNKERS & CO) | | TECHNICAL FIELDS SEARCHED (Int. Cl. ³) |
| | -- | | |
| A | DE - A1 -2 340 648 (BRAUN AG) | | F 23 D 13/00 |
| | -- | | F 23 D 15/00 |
| A | DE - A - 2 249 689 (OHSAWA MANUFACTURING) | | F 23 Q 2/00 |
| | ---- | | F 23 Q 7/00 |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| VIENNA | 20-07-1984 | WITTMANN |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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